

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
27 November 2003 (27.11.2003)

PCT

(10) International Publication Number
WO 03/098336 A1

(51) International Patent Classification⁷: **G02F 1/13357**,
G02B 6/00

108-8507 (JP). NASU, Kousuke [JP/JP]; Philips Japan, Ltd., Philips Bld., 2-13-37, Kohnan, Minato-ku, Tokyo 108-8507 (JP).

(21) International Application Number: **PCT/JP03/01969**

(22) International Filing Date: **12 May 2003 (12.05.2003)**

(74) Agent: **AOKI, Hiroyoshi**; Philips Japan, Ltd., Philips Bldg., 2-13-37, Kohnan, Minato-ku, Tokyo 108-8507 (JP).

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:
2002-143489 **17 May 2002 (17.05.2002)** **JP**

(71) Applicant (for all designated States except US): **KONINKLIJKE PHILIPS ELECTRONICS N.V. [NL/NL]**;
Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(72) Inventors; and

(75) Inventors/Applicants (for US only): **TSUDA, Akimitsu [JP/JP]**; Philips Japan, Ltd., Philips Bldg., 2-13-37, Kohnan, Minato-ku, Tokyo 108-8507 (JP). **TAKAHASHI, Satoru [JP/JP]**; Philips Japan, Ltd., Philips Bldg., 2-13-37, Kohnan, Minato-ku, Tokyo 108-8507 (JP). **HUCK, Hubertina, Petronella, Maria [NL/NL]**; Philips Japan, Ltd., Philips Bldg., 2-13-37, Kohnan, Minato-ku, Tokyo

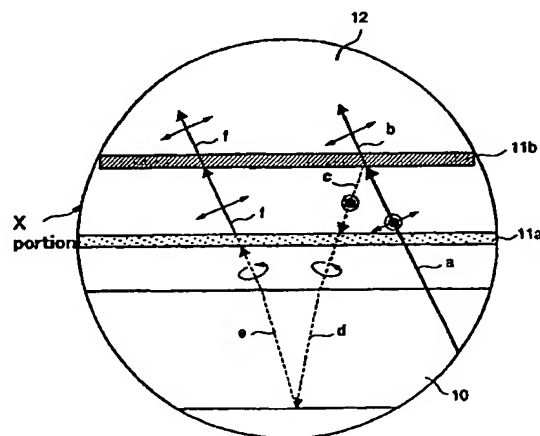
(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

[Continued on next page]

(54) Title: **LIQUID CRYSTAL DISPLAY DEVICE AND SURFACE LIGHTING DEVICE**



(57) **Abstract:** To increase an amount of the light that can be used for the display efficiently in the total amount of the emitted light in the liquid crystal display device having the surface lighting device such as the front-light. The light (a) becomes the light component of the linearly polarized light by passing the retardation plate (11a). In the reflective polarizer (11b), only the light (b) that is a component of the polarization axis of the reflective polarizer (11b) passes through the reflective polarizer (11b) to enter into the end portion of the light guide (12). The light that is a component other than the component of the polarization axis of the reflective polarizer (11b) is reflected on the reflective polarizer (11b). The light reflected on the reflective polarizer (11b) changes from the linearly polarized light to the circularly polarized light by passing through the retardation plate (11a). The circularly polarized light (d) is transmitted into the light stick (10) and is reflected on the reflective film in the light stick (10). The reflected light (e) change from the circularly polarized light to the linearly polarized light by the retardation plate (11a). The linearly polarized light (f) passes through the polarization axis of the reflective polarizer (11b) to enter into the end portion of the light guide (12).